QUALITY ASSURANCE PROJECT PLAN AND WORK PLAN

FOR THE

AIR TOXICS MONITORING PROJECT

OF THE

CHEROKEE NATION ENVIRONMENTAL PROGRAMS

DECEMBER, 2007

Prepared For

U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

By

CHEROKEE NATION ENVIRONMENTAL PROGRAMS
P. O. Box 948
Tahlequah, Oklahoma 74465
918-453-5005, FAX 918-458-5499
E-Mail: http://www.itecmembers.org

CHEROKEE NATION

P.O. Box 948
Tahlequah, OK 74465-0948
918-456-0671

Chad "Corntassel" Smith
Principal Chief

Joe Grayson, Jr.
Deputy Principal Chief

12 December, 2007

Aunjanee Gautreaux, 6PD-Q
Air Quality Analysis Section
U. S. EPA
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: APPROVAL OF REVISED QAPP FOR CNEP AIR TOXICS MONITORING PROJECT

Dear Aunjanee:
Enclosed please find the Revised QAPP/Work Plan (Revision 2) for the Cherokee Nation Environmental Programs (CNEP) Air Toxics Monitoring Project. This revised QAPP replaces Revision 1 of the QAPP that EPA approved in October, 2006. Please send me an e-mail acknowledging receipt of this revised QAPP, and please send me the Q-Trak number for this QAPP. Please sign and date the signature page and return it (or a copy of it) to me.

The goals, data quality requirements, and sampling and analysis procedures of this project have not changed during the past year. Therefore, the only changes in Revision 2 of the QAPP are as follows:

(1) Changes in CNEP staff are reflected in Section 1.3 and in Figure 2.

(2) The old Tables 1 and 3 in Appendix A of Revision 1 have been eliminated, and the old Table 2 of Revision 1 is now Table 1 in Revision 2. The new Table 1 shows the VOCs that are currently included in ERG's Method TO-15 sample analysis and the MDLs ERG is currently able to achieve for those VOCs.

I am providing a copy of this QAPP to the lab (ERG) that is analyzing the samples for this project. There is a place for ERG's Program QA Officer to sign on the signature page. ERG's approval is not required for this QAPP. Nevertheless, I thought it would be worthwhile to have ERG's Program QA Officer sign the signature page just to acknowledge that the lab concurs with the QA/QC requirements of this project.

If you have any questions, please call me at 918-453-5095, or call Ryan Callison at 918-453-5093. Thanks.

Sincerely,

Kent Curtis

Kent Curtis, Environmental Specialist II, CNEP, kcurtis@cherokee.org

Concur: Ryan Callison, Environmental Specialist III, CNEP

Enclosure

cc: Ryan Callison
OES File

QUALITY ASSURANCE PROJECT PLAN AND WORK PLAN

FOR THE

AIR TOXICS MONITORING PROJECT

OF THE

CHEROKEE NATION ENVIRONMENTAL PROGRAMS

DECEMBER, 2007

Prepared For

U. S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

By

CHEROKEE NATION ENVIRONMENTAL PROGRAMS
P. O. Box 948
Tahlequah, Oklahoma 74465
918-453-5005, FAX 918-458-5499
E-Mail: http://www.itecmembers.org

APPROVAL PAGE
for Cherokee Nation Environmental Programs Air Toxics Monitoring Project QAPP

For Cherokee Nation:

Jeannine Hale Date 12-11-07
Jeannine Hale, Administrator of Cherokee Nation Environmental Programs

Nancy John Date 12/11/07
Nancy John, Director of Environmental Programs, CNEP

_____ Date _____

Ryan Cal Date 12/11/07
Ryan Callison, Environmental Specialist III, Manager of CNEP Air Quality Monitoring

Kent Curtis Date 12/11/07
Kent Curtis, Environmental Specialist II, QA Manager of CNEP Air Toxics Monitoring Project

CERTIFIED HAZARDOUS MATERIALS MANAGER
KENT M. CURTIS
10143
CHMM

For laboratory selected to analyze project samples:

_____ Date _____
Ray Merrill, Program QA Officer, ERG, Inc.

For U. S. Environmental Protection Agency, Region 6

Aunjanee G. Gautreaux Date 1/17/08
Aunjanee Gautreaux, Air Quality Analysis Section (6PD-Q)

_____ Date _____

TABLE OF CONTENTS

TABLE OF CONTENTS

DISTRIBUTION LIST

Approved copies of this CNEP Air Toxics Monitoring Project QAPP and each of its subsequent revisions will be distributed to the following persons and organizations:

- Ryan Callison, who is currently the manager of the CNEP Air Quality Monitoring program
- Kent Curtis, QA manager for this project, who shares responsibility with Ryan Callison for quality assurance and quality control for the CNEP
- Aunjanee Gautreaux, Air Quality Analysis Section for the U. S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas
- Environmental contractors hired by the CNEP to perform specific tasks, such as analyzing canister samples.

In addition, approved copies of this QAPP and its subsequent revisions may also be distributed to other individuals and organizations that are involved in specific site assessment projects with ITEC. Such individuals and organizations may include the following:

- Epidemiologists within the Cherokee Nation's Department of Health Services.

SECTION 1
PROJECT MANAGEMENT

1.1 Introduction

A 9000-acre industrial park is located in rural Mayes County, Oklahoma. A coal-fired power plant, a gas-fired power plant, chemical and plastic industries, paper product industries, a foundry, and other industries are located in this industrial park. Truck traffic is considerable in and around the industrial park. These fixed and mobile sources are known to emit criteria pollutants (CO, NOx, SO_2, and particulate matter [PM10 and PM2.5]), volatile organic compounds (VOCs), and other hazardous air pollutants (HAPs).

All major point sources in Mayes County are clustered in or near the industrial park, as are the tribal population centers of Pryor, Chouteau, Locust Grove, Salina, Sportsman Acres, and Cherokee Heights. Cherokee Heights is less than one mile from some sections of the industrial park (**Figure 1**).

According to the 1999 National Cancer Institute Database, Mayes County has the second highest death rate (males) for respiratory types of cancer in Oklahoma - rates that are 32% greater than the United States average. The most recent data indicate a slight rate increase for Mayes County - a rate 40% higher than the US average. In addition, Oklahoma State Department of Health data show that fetal death rates for Mayes County are over twice the state average for the period examined.

The State of Oklahoma has not conducted air toxics monitoring in Mayes County in the past. Thus no data for air toxics concentrations in ambient air in Mayes County were available prior to the screening project conducted by the Cherokee Nation in the winter of 2004-2005. A brief summary of this screening project is provided below in this Introduction.

The Cherokee Nation's Environmental Programs (CNEP) is concerned about the possible impacts of point source emissions from the Mayes County industrial park on the health of tribal members living near the park. The CNEP established an ambient air monitoring site (Pryor site) on tribal trust land at the Cherokee Heights community in 2004. This site is approximately 3.8 miles from the coal-fired power plant, 1.5 miles from the gas-fired power plant, and 0.75 mile from the sewage lagoon of the industrial park (**Figure 1**). The GPS coordinates for the site are 36.228° north latitude and -95.249° west longitude, and the AQS ID number for the site is 40-097-9014. Current instrumentation at the site includes the following: R & P TEOM for continuous PM10 measurement (Federal Equivalent Method), R & P TEOM with FDMS for continuous PM2.5 measurement (the FDMS includes reference flow to account for volatile loss), R & P 2025 sequential sampler for PM2.5 (Federal Reference Method), API gaseous monitors for NOx, NOy, ozone, and SO_2, and MetOne meteorological instruments for wind speed, wind direction, ambient temperature, and relative humidity. In addition, the site includes one RM 910A VOC sampler for collecting ambient

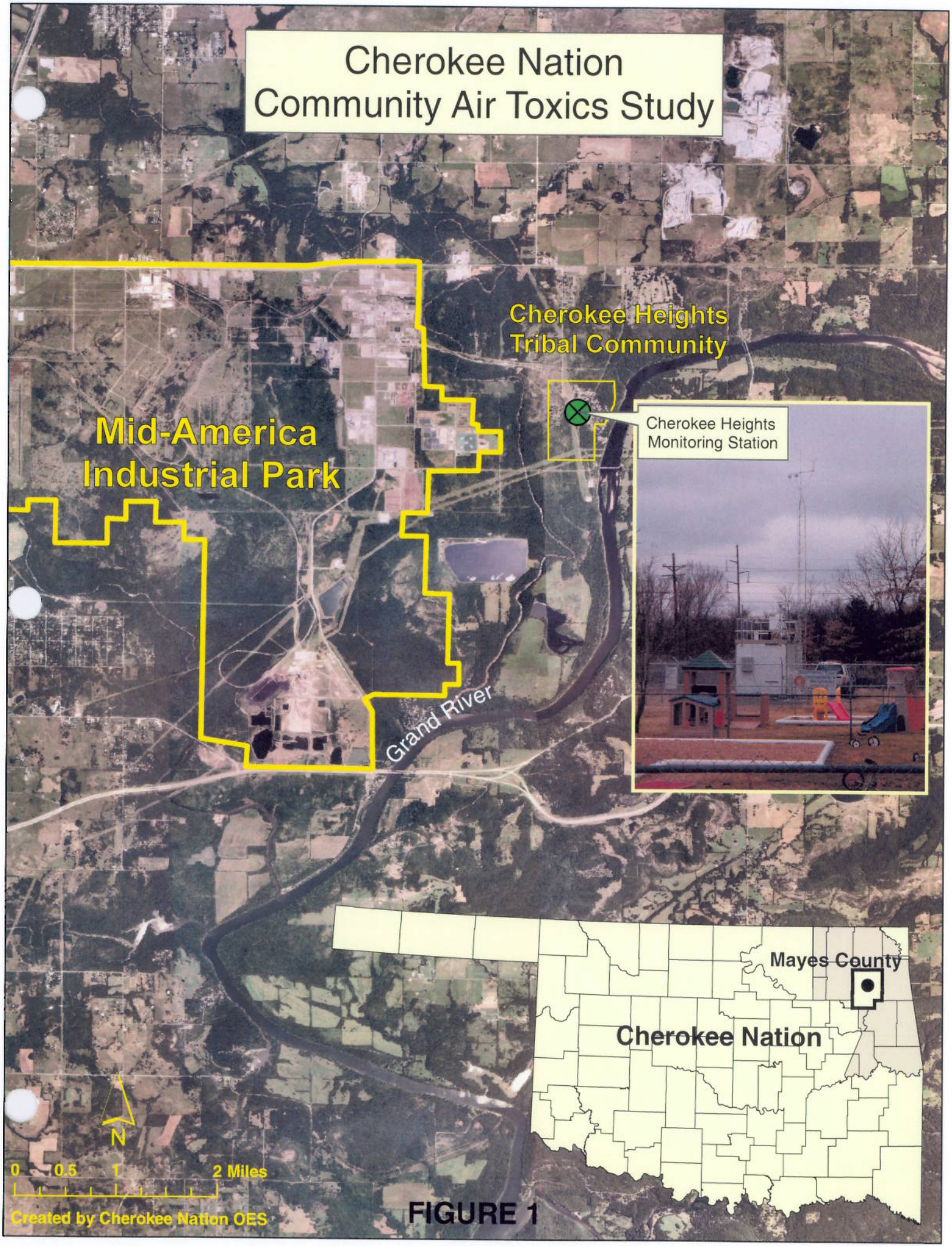

Cherokee Nation
Community Air Toxics Study
Cherokee Heights
Tribal Community
Mid-America
Industrial Park
Cherokee Heights
Monitoring Station
Grand River
Mayes County
Cherokee Nation
N
0 0.5 1 2 Miles
Created by Cherokee Nation OES

FIGURE 1

air samples in vacuum canisters.

The CNEP conducted a VOC screening project at the Pryor site during the winter of 2005 (December 23, 2004 to March 29, 2005). Fifteen samples were collected in vacuum canisters and analyzed via GC/MS in accordance with EPA Test Method TO-15. The sampling interval was 1-in-6 days and each sample was a 24-hour composite. The results of the screening project were as follows: (1) 24 of 59 VOCs were detected in one or more samples; (2) 15 of the 24 detected VOCs were hazardous air pollutants (HAPs); (3) only 5 detected VOCs (HAPs) exceeded an EPA health-based benchmark in one or more samples, but 4 of these 5 VOCs are respiratory carcinogens (benzene, MTBE, methylene chloride, TCE). Thus the data for this short-term screening project revealed a potential problem with VOC air toxics in the Cherokee Heights area.

This QAPP covers additional VOC sampling that will be conducted at the Pryor site during the 18-month sampling period of this project in 2006-2008, as well as any subsequent VOC sampling that might be conducted at that site.

This QAPP will be modified to cover additional VOC monitoring projects at Pryor and at other locations, if such additional projects are identified and funded in the future. This QAPP will also be modified to cover other air toxics (metals, carbonyls) monitoring projects, if such projects are identified and funded in the future.

1.2 Project Description

The CNEP will follow up its previous VOC screening project at Pryor with additional VOC sampling at the same site during an 18-month sampling period that will begin on or about September 26, 2006 and end on or about March 22, 2008. This 18-month sampling period will ensure that seasonal variations in VOC concentrations can be documented. The purpose of this sampling project is to obtain additional data about the concentrations of VOCs in ambient air at the Pryor site and in the adjacent Cherokee Heights tribal community. The six primary objectives of this project are as follows:

(1) Collect VOC toxics data at Pryor site for 18 months so that seasonal variations in VOC concentrations can be documented.

(2) Focus on hazardous air pollutants (VOC HAPs) identified as "drivers" in 1999 NATA, as well as on VOC HAPs detected in the CNEP's screening project in winter of 2004-2005.

(3) Analyze data, identifying VOCs of concern, determining which VOCs exceed EPA human health benchmarks, and identifying sources of VOCs, if possible.

(4) Process data so it can be used in a future human health risk assessment.

(5) Share data with EPA, state of Oklahoma (ODEQ), Cherokee Nation, and general public via AQS, XML flat file, and other means, as appropriate.

(6) Share data with residents of Cherokee Heights via public meeting.

The CNEP's air quality monitoring staff will collect VOC samples every sixth day for 18 months in vacuum canisters for a 24-hour sample period. Ambient air will be drawn through a flow-metering device into the canister, producing a 24-hour time-weighted-average (TWA) sample. The single sampling system that was originally located at the CNEP's Pryor site has been modified so that duplicate samples can be collected from the same intake manifold. The CNEP will ship exposed canisters to an appropriate laboratory for analysis.

Eastern Research Group, Inc. (ERG) has been selected to analyze the samples for this project. ERG is the contractor for the U. S. EPA's Urban Air Toxics Monitoring Program (UATMP) and National Air Toxics and Trends Stations (NATTS) monitoring networks. ERG operates under an approved U. S. EPA Level 1 Quality Assurance Project Plan and is regularly audited by the EPA to ensure quality that exceeds the requirements in both the PAMS and the NATTS Technical Assistance documents. ERG is a National Environmental Laboratory Accreditation Council (NELAC) certified laboratory for canister analysis by EPA Compendium Method TO-15A. ERG's QAPP, *Support for the EPA National Monitoring Programs (NMOC, UATMP, PAMS, HAPs, and NATTS), Quality Assurance Project Plan, Category 1*, is included in **Appendix C** of this CNEP QAPP.

ERG has or will perform an EPA Compendium Method TO-15 certification of the CNEP's RM 910A VOC sampler prior to the collection of samples for this and subsequent projects. The CNEP will provide 6-liter vacuum canisters to ERG, and the lab will clean and return the canisters to the CNEP, with each canister having a vacuum of −29 to −30 inches of Hg (approximately 1 atm absolute).

After sample collection, the CNEP will return each canister to ERG for analysis. Each canister must have a vacuum no higher than −1 inches of Hg after sample collection. ERG will analyze the exposed canisters for a suite of approximately 60 VOCs by means of EPA Compendium Method TO-15. [A copy of *Compendium Method TO-15* is included in **Appendix B** of this QAPP.] The suite of VOCs will include VOC HAPs identified as "drivers" in the 1999 NATA and VOC HAPs detected in the CNEP's screening project in the winter of 2004-2005. The "drivers" include benzene, carbon tetrachloride, chloroform, 1,3-butadiene, 1,2-dichloropropane, methylene chloride, tetrachloroethylene, trichloroethylene, and vinyl chloride. Of the 24 VOCs detected in the CNEP's screening project, particular emphasis will be given to those 5 VOCs (benzene, MTBE, methylene chloride, TCE, and m,p-xylene) that exceeded an EPA human health benchmark. VOCs that will or may be included in canister sample analyses are listed in **Table 1** in **Appendix A** of this QAPP. This table also shows the method detection limits (MDLs) that are required or desired, along with EPA human health benchmarks for each of the listed VOCs.

ERG may not be able to meet the desired MDLs for 13 of the VOCs (see far right column of **Table 1** in **Appendix A** of this QAPP). If this is the case, the CNEP will accept the MDLs that the lab can meet for these 13 VOCs, even though some EPA benchmarks for these VOCs are lower. This may limit the uses of the data for these VOCs, as the data may not fully support the requirements of a human health risk assessment.

In addition to analyzing the samples, ERG will also provide the CNEP with technical support and data management for this project. The lab will report canister sample data to the CNEP and to the U. S. EPA Air Quality System (AQS) database, as described in Section 2.10 of this QAPP.

1.3 Project Organization

Overall management of this and future air toxics monitoring projects is the responsibility of Ryan Callison, who is manager of the CNEP air quality monitoring program. Day to day management and data analysis for this project are the responsibility of Kent Curtis, who is also responsible for quality assurance and quality control (QA/QC) for the project. Responsibility for oversight of contracts and budgets, as well as coordination with the U. S. EPA and the selected laboratory, will be shared by Ryan and Kent. Responsibility for equipment maintenance, sample collection, and shipment of canisters is shared among the entire air quality monitoring staff of the CNEP. This staff currently consists of seven persons: Ryan Callison, Kent Curtis, April Hathcoat, Jacque Adam, Jeremy Freise, Larry Scrapper, and Danielle Keese. The organizational chart for the CNEP is shown in **Figure 2**. This chart shows only the CNEP staff that are directly involved in the management, implementation, and support of this project. CNEP staff who do not work in air quality monitoring are not shown in **Figure 2**.

The EPA has recommended that the CNEP designate a full-time QA/QC Manager who functions independently of direct environmental data generation [in accordance with EPA Order 5360.1, paragraph 6a(1)]. However, it is not always practical for the CNEP to do this because of its small number of personnel. Thus the person who is responsible for QA/QC management of a project may also have to participate in the generation and analysis of data at certain times on that project. On this and future air toxics monitoring projects, Kent Curtis will be responsible for QA/QC management as well as data generation and analysis, while the overall project manager - Ryan Callison - may provide an additional level of semi-independent QA/QC management. If necessary, Kent Curtis will function as a semi-independent QA/QC manager for this project and will not be involved in the collection of project samples, although he may still be involved in project data analysis.

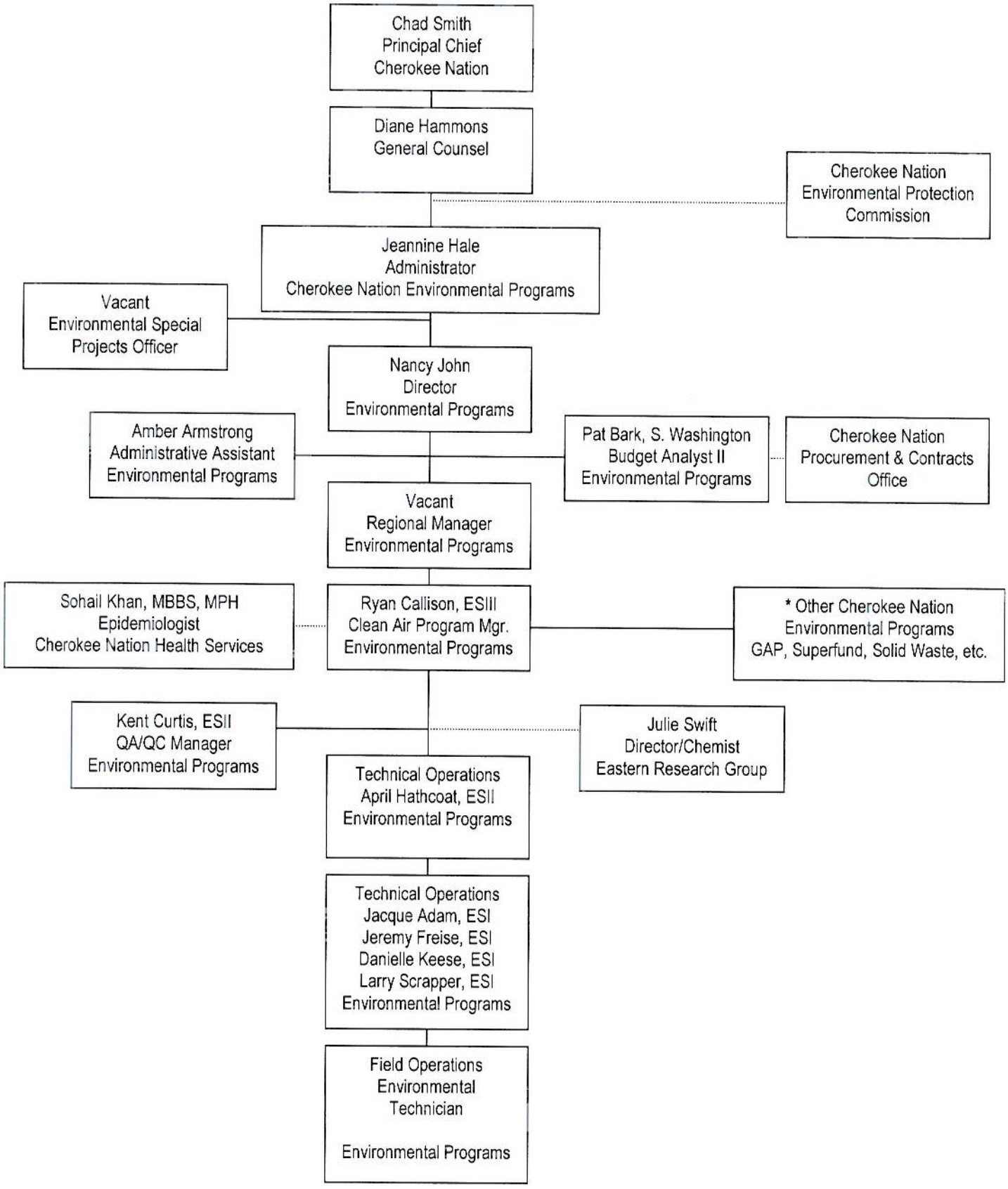
Specific responsibilities of CNEP personnel are as follows:

Ryan Callison, Manager, CNEP air quality monitoring

- project management and coordination among CNEP, contracted laboratories, and U. S. EPA

Cherokee Nation Environmental Programs
Organizational Chart

Figure 2



Note: *Chart shows only those CNEP staff directly involved in the Community Air Toxics Project

Region 6

- consult with managers, administrators, and accounting personnel on budgetary and funding issues
- interact with laboratory personnel through conference calls and e-mail communications to ensure successful completion of project
- coordinate with CNEP monitoring and quality assurance personnel to provide such support as needed to ensure their ability to fulfill their responsibilities
- coordinate with project manager/quality assurance program manager in preparing final report

Kent Curtis, responsible for day-to-day project management, data analysis, and project QA/QC

- oversee all aspects of field operations, including quality assurance
- prepare and distribute the Quality Assurance Project Plan and ensure that the provisions and procedures specified therein are implemented
- advise CNEP air quality monitoring management and staff on all aspects of the project affecting data quality, including, but not limited to, operational procedures, data validity and flagging, quality control checks and procedures, data management, etc.
- ensure monitoring staff receives adequate training, material, and logistical and data management support
- oversee scheduling of site visits, equipment calibrations, and routine operational and quality checks
- consult with managers, administrators, and accounting personnel on budgetary and funding issues
- report to CNEP and EPA personnel on project operations and results
- review and analyze data reports, field reports, quarterly data submittals, and other reports to ensure correctness and continuity of operations and to assess quality of data
- interact with laboratory personnel through conference calls and e-mail communications to ensure proper data management, transmittal and formats, and to ensure successful completion of project
- coordinate with manager of CNEP air quality monitoring in preparing final project report

Environmental Specialists (April Hathcoat, Jacque Adam, Jeremy Freise, Danielle Keese, and Larry Scrapper)

- serve as site operators
- receive and ship canisters with all required documentation in coordination with contracted laboratory
- install and retrieve canisters and operate sampling equipment in accordance with instructions provided by contracted laboratory
- maintain and keep current all required documentation associated with sampling, including site logbook and field data sheets

- provide site security, upkeep, and routine maintenance
- perform operational and quality control checks in accordance with required schedules
- perform routine maintenance and, in consultation with contracted laboratory, minor repairs on sampling equipment
- coordinate with project managers and quality assurance manager regarding resolution of data validity questions arising from field operations
- immediately notify project managers and quality assurance manager of any problems

The contracted laboratory (ERG, Inc.) on this current project will certify the CNEP's sampling equipment, provide technical and logistic support, and will clean and prepare the CNEP's sample canisters. It will analyze sample canisters for volatile organic compounds (VOCs) as listed in **Table 1** in **Appendix A** of this QAPP. Samples will be analyzed in accordance with EPA Compendium Method TO-15, as shown in **Appendix B** of this QAPP, and in accordance with the laboratory's QAPP (see **Appendix C**). The lab will also prepare and provide data reports to the CNEP and to the U. S. EPA Air Quality System (AQS) database, as described in Section 2.10 of this QAPP. Specific responsibilities of the laboratory are as follows:

- provide TO-15 certification of CNEP's sampling equipment prior to initiation of sampling
- provide training, instructions, and/or technical support on equipment operation, sample collection, and documentation to CNEP staff (field operators)
- provide laboratory services, including delivery of clean sample canisters and analysis of samples
- provide a laboratory analysis QAPP, periodic progress reports, data reports, data files in approved format, QA reports, invoices, and other deliverables to CNEP
- provide shipping containers, shipping, sample data/tracking forms, and instructions to field operators regarding sample handling, documentation, and shipping procedures
- provide data entry, processing, management, and analysis and delivery of sample data to CNEP, as well as data entry into AQS
- conduct QA/QC functions as specified in **Appendix C**

Responsibilities of EPA Region 6 personnel are as follows: (1) ensure that CNEP's administrative needs and concerns (budgetary, grant, and contract issues) are understood and addressed; (2) review and approve project work plan and QAPP, as well as any changes to the project work plan and QAPP; and (3) provide technical support to CNEP as requested and as resources permit.

1.4 Data Quality Objectives

Data quality objectives for this project are described in *Compendium Method TO-15* in **Appendix B** of this QAPP and in the ERG laboratory QAPP in **Appendix C**. Data quality objectives and technical requirements for this project are also described in *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004).

Method Detection Limits (MDLs) for sample analyses are specified in **Table 1** in **Appendix A** of this QAPP. Ideally, each MDL should be lower than the lowest EPA human health benchmark displayed for the corresponding VOC in **Table 1**. However, some of these MDLs may be lower than the contracted laboratory (ERG, Inc.) can reasonably achieve. In such cases, the CNEP's QA/QC manager for this project will discuss the feasibility of certain MDLs with the contracted laboratory and reach an agreement on the MDLs that will be accepted. MDLs that are higher than EPA human health benchmarks may limit the useability of the corresponding data for future human health risk assessments.

1.5 Special Training Requirements and/or Certification

The contracted laboratory (ERG, Inc.) and the sampling equipment manufacturer will provide training to CNEP personnel on sample equipment operation, sample collection, and/or sample handling. In addition, one or more CNEP personnel involved with this project, including the air quality monitoring program manager and the QA/QC manager for this project, may attend one or more specialized training courses, such as the *Air Toxics Monitoring* course offered by Northern Arizona University's Institute for Tribal Environmental Professionals, and the *Introduction to Hazardous Air Pollutants* and *Sources and Control of Volatile Organic Air Pollutants* courses offered by the U. S. EPA's Air Pollution Training Institute.

1.6 Documentation and Records

All critical documents associated with this project will be managed and permanently retained by the CNEP in its air quality monitoring program files. These documents may include, but are not limited to, site documentation files, site logbooks, site visit forms, air toxics sampler logbooks, sample data forms, shipping records, and all reports and records provided by the contracted laboratory.

The contracted laboratory (ERG, Inc.) will keep the following project documents for at least three years after project completion or will provide them to the CNEP for retention: laboratory notebooks, logbooks, and log sheets; sample handling and custody records; inspection and maintenance records; original data downloaded from sampling equipment, if applicable; field data sheets; data/summary reports; formatted data submittals, as applicable; data management algorithms; data base design; data management plans, flow charts, and SOPs; quality control charts; data quality assessments; QA reports; system audits and reviews; corrective action reports; and other documents, if applicable.

Automated systems will be used extensively to record, maintain, and analyze project data. The CNEP and the contracted laboratory (ERG, Inc.) will be responsible for maintaining systems required for data retrieval and for transferring data to appropriate media should this become necessary.

SECTION 2
DATA GENERATION AND ACQUISITION

2.1 Sampling Process Design

Vacuum canister samples will be collected every sixth day for a period of 18 months, with an approximate start date of September 26, 2006 and an approximate end date of March 22, 2008 (see proposed sampling schedule in **Appendix G**). Each sample will be a 24-hour time-weighted-average (TWA) sample. The single sampling system that was originally located at the CNEP's Pryor site has been modified so that duplicate samples can be collected from the same intake manifold. Duplicate samples will be collected at least once in every ten sampling events, or as often as every fifth sampling event, pending agreement with the EPA and with the contracted laboratory. The CNEP will ship exposed canisters to an appropriate laboratory for analysis.

Sampling will be conducted at the CNEP's Pryor monitoring site (AQS ID number 40-097-9014). The Pryor site is located on tribal trust land at the Cherokee Heights community, in close proximity to the Mayes County industrial park. The site is approximately 3.8 miles from the coal-fired power plant, 1.5 miles from the gas-fired power plant, and 0.75 mile from the sewage lagoon of the industrial park (**Figure 1**). The GPS coordinates for the site are 36.228° north latitude and -95.249° west longitude. The site is located and designed in accordance with siting criteria set forth in 40 CFR 58, Appendices A and D, and has been reviewed and approved by the U. S. EPA Region 6 office.

Sampling equipment operation and sample collection will be conducted in accordance with standard operating procedures included in **Appendix F** of this QAPP, and in accordance with procedures described in EPA's *Compendium Method TO-15* (**Appendix B**), in the contracted laboratory's QAPP (**Appendix C**), and in *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004).

The contracted laboratory (ERG, Inc.) will analyze the samples for the 60 VOCs listed in **Table 1** of **Appendix A** of this QAPP. Sample analyses will be performed in accordance with procedures described in EPA's *Compendium Method TO-15* (**Appendix B**), in ERG's QAPP (**Appendix C**), and in *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004).

2.2 Sampling Method Requirements

The primary purpose of this project is to determine the concentrations in ambient air of VOCs listed in **Table 1** of **Appendix A** of this QAPP. The resulting data will be used to assess the exposure of the tribal community in the Cherokee Heights area to VOCs. The data may also be used in a human health risk assessment for the tribal community. Given these requirements, the data must be of sufficient quality to support the needs of a human health risk assessment. Thus the MDLs for all or

most of the VOCs analyzed in this project must be equal to or lower than the lowest EPA human health benchmarks shown in **Table 1** of **Appendix A** of this QAPP. In addition, sufficient duplicate, blank, and/or spike samples must be collected to assess the precision and accuracy of the resulting project data (see Section 2.5 below). Finally, a sufficient number of samples must be collected to support statistical analyses of data and the decision making process (see Section 2.5 below). The desired data completion rate for this project is 85%; that is, valid data for each VOC should be obtained from 85% of all samples collected [see Section 4.1.4.2 of *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004)].

2.3 Sample Handling and Custody

The contracted laboratory (ERG, Inc.) will provide all necessary containers, forms, and instructions for receiving, deploying, retrieving, and returning sample canisters. A field data sheet or equivalent will accompany each canister at all times from receipt to return shipment (see "SOP and Field Sample Report Form" in **Appendix F**, and see Figure 9-2 in the ERG QAPP in **Appendix C**). The field data sheet may serve as a chain of custody document. Each canister will have a unique identifier permanently affixed to it, which will be recorded on the field data sheet, and by which it will be associated with a particular sampling event (see "CNEP Canister Numbers for VOC Samples" in **Appendix F**).

Sample custody and handling procedures within ERG are described in **Appendix C** of this QAPP.

2.4 Analytical Procedures Requirements

The contracted laboratory (ERG, Inc.) will analyze samples for the 60 VOCs listed in **Table 1** of **Appendix A** of this QAPP. Sample analyses, including analytical procedures, method requirements, equipment used, and associated quality control and quality assurance procedures, will be performed in accordance with procedures described in EPA's *Compendium Method TO-15* (**Appendix B**) and in ERG's QAPP (**Appendix C**). To the extent feasible, ERG will meet the MDLs listed in **Table 1** of **Appendix A**. ERG will provide QA reports to the CNEP to document adherence to the procedures described in ERG's QAPP. ERG will cooperate with CNEP personnel to resolve any problems identified.

2.5 Quality Control Requirements

The CNEP will comply with and employ the EPA's Data Quality Objectives (DQO) process when planning, conducting, and evaluating this project. The primary goal of this project is to acquire basic data about the concentrations of VOCs in ambient air at the Cherokee Heights community. The resulting data will reveal whether VOC concentrations in ambient air pose a potential threat to the health of the Cherokee Heights tribal community. If the data suggest such a threat, then the data may be used in a subsequent human health risk assessment project. Given the primary goal of this current

project, and given the fact that critical management decisions (such as issuing health advisories, moving residents, or petitioning the state or EPA to conduct enforcement actions against nearby industrial facilities), though possible, are not likely to result from this project, no effort has been made to calculate decision error limits for the project. Consequently, a default value of 5% may be adopted for the decision error limits for this project.

Quality control checks performed in the course of laboratory analysis, including analyses of blank, spike, and replicate samples, and including environmental controls and other checks are the responsibility of the contracted laboratory (ERG, Inc.). Such quality control checks are described in ERG's QAPP, which is included in **Appendix C** of this QAPP. Lab data quality should meet the requirements of EPA Compendium Method TO-15 (**Appendix B** of this QAPP). For example, a replicate precision value of 25% should be achieved for each of the target VOCs.

CNEP field personnel will perform all field quality control procedures specified by ERG. Field quality control checks will include duplicate samples and may, if funding permits, include blank samples. There will be at least one blank sample for every ten samples. Duplicate samples will be collected at least once in every ten sampling events, or as often as every fifth sampling event, pending agreement with the EPA and with ERG (see proposed sampling schedule in **Appendix G**). EPA Region 6 has the option of providing spike sample canisters for analysis, and it also has the option of providing for split samples, with one split sample being analyzed by an independent lab. One spike or split sample will be provided in each three-month quarter of regularly scheduled sampling during the project.

CNEP personnel will perform a flow verification check of the RM910A sampler prior to commencement of the 18-month sampling period and immediately after the end of the 18-month sampling period. This flow verification will be performed as described in Section 2.7 below. The CNEP may perform a flow verification at least once during the 18-month sampling period or more often, if necessary, to ensure that the sampler flow rate remains within acceptable limits (see Section 2.7 below).

The desired data completion rate for this project is 85%; that is, valid data for each VOC should be obtained from 85% of all samples collected [see Section 4.1.4.2 of *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004)].

The CNEP will perform basic statistical analyses of project data. At its option, the CNEP may have the contracted laboratory - ERG, Inc. - perform these statistical analyses. The following analyses will be performed for each VOC listed in **Table 1** of **Appendix A**: (1) calculation of mean and median concentrations of each VOC for the sampling period of interest; (2) calculation of variance and standard deviation for each VOC for the sampling period; (3) calculation of the range of concentrations (minimum and maximum) for each VOC for the sampling period; (4) characterizing the distribution (normal or lognormal) of the data for each VOC for the sampling period; and (5)

calculating the number of "non-detect" concentrations for each VOC for the sampling period. "Non-detect" concentrations will be set equal to one-half the MDL that the contracted lab can achieve, after which these "non-detect" data values will be included in the data set for the calculation of mean, median, variance, standard deviation, range, and data distribution. "Non-detect" data values and outliers will not be rejected prior to such calculations unless there is some compelling reason to do so. These statistical analyses will support the calculation of more refined decision error limits, if such modified error limits are desired in the future.

In addition, the CNEP or ERG may calculate the correlation between the concentrations of two or more VOCs that are expected to occur together. For example, if VOCa is present, then VOCb should be present also, either because VOCa gives rise to VOCb, or because both VOCa and VOCb are generated by the same source or by the same chemical processes.

2.6 Equipment Inspection and Maintenance

CNEP personnel will be responsible for initial setup of sampling equipment. The equipment manufacturer and the contracted laboratory (ERG, Inc.) will assist and cooperate in this effort. All subsequent inspection and maintenance of equipment will be performed by CNEP personnel in accordance with instructions provided by ERG and by the equipment manufacturers. The equipment manufacturer and ERG will provide additional technical and logistic support should it become necessary to fulfill project goals. CNEP personnel will inspect equipment at least once every six days (the day after each sampling event) to ensure timely correction of any problems and to minimize the loss of samples.

2.7 Instrument Calibration

Calibration and verification of sampling parametric measurements is required to maintain acceptable performance and data quality standards. Calibration and/or verification may be performed on sampler input and output channels, flow rate sensors, temperature and pressure sensors, and/or other measurement devices and sampling equipment.

The CNEP's VOC sampling equipment undergoes three kinds of QA/QC checks. The first of these checks is performed by the manufacturer of the sampling equipment; the second of these checks is performed by the lab (ERG, Inc.) that analyzes the samples for this project; and the third check is performed by the CNEP itself.

The manufacturer of the RM910A VOC sampler performs a "mechanical performance test" on this equipment before shipping it to the CNEP for use in this project. A mechanical performance test includes cleaning of all parts of the sampler, including tubing, that touch the sampled air; cleaning and calibration of the mass flow controller; cleaning and calibration of the pressure transducer; and a leak check. A mechanical performance test was performed on both the CNEP's primary and backup RM910A samplers prior to commencement of sample collection for this project. If either

sampler must be returned to the manufacturer for repairs during this project, the manufacturer will perform another "mechanical performance test" on the sampler before returning it to the Cherokee Nation.

The lab (ERG, Inc.) has performed or will perform an EPA Compendium Method TO-15 "canister sampling system certification" (aka, NATTS Certification) on each of the Cherokee Nation's RM910A samplers (plus tubing associated with each sampler) in accordance with *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004, section 4.1.5). In a NATTS certification procedure, ERG simultaneously passes a challenge gas with known concentrations of certain VOCs through both the Cherokee Nation's sampler and tubing and through the lab's own manifold. The challenge sample collected from the Cherokee Nation's sampler and the reference sample collected from the lab's manifold are analyzed and compared, with the difference in sample results being quantified. Both the Cherokee Nation's sampler and the lab's system should have recoveries of 85% to 115%. Then zero air is passed through both the Cherokee Nation's sampler and the lab's manifold and zero (blank) samples are collected and analyzed. The concentration of each target analyte in the blank samples should be 0.2 ppbv or less. The purpose of this certification procedure is to quantify the potential for the Cherokee Nation's RM910A sampler to cause positive or negative bias in VOC concentrations in air samples. The sampler and its associated tubing must exhibit minimal potential for biasing before they can be used to collect samples.

The Cherokee Nation's primary RM910A sampler passed a NATTS certification prior to commencement of sample collection. The Cherokee Nation's backup sampler also passed a NATTS certification after it was received from the manufacturer and before its potential use to collect any samples. This certification will be performed on each sampler once in each calendar year, if the CNEP deems it necessary for the purpose of data quality control. The primary sampler and, if necessary, the backup sampler will undergo NATTS certification after the conclusion of sample collection for this project in order to document the potential for bias in sample data obtained during this project. Lab records of the NATTS certifications will be retained in CNEP files.

The CNEP can or will perform a variety of QA/QC checks on its RM910A samplers. Such checks may include flow verification checks and any other calibrations or performance verifications that can be performed by the CNEP itself rather than by the equipment manufacturer or by the lab. CNEP personnel will perform such checks of sampler performance on a routine basis when the sampler is in operation at the CNEP's Pryor site. CNEP personnel will follow calibration/verification procedures provided by the equipment manufacturer (**Appendix D** of this QAPP), by the contracted laboratory, and in EPA's *Compendium Method TO-15* (**Appendix B** of this QAPP).

CNEP personnel will perform a flow verification check of the RM910A sampler prior to commencement of the 18-month sampling period and immediately after the end of the 18-month sampling period. The CNEP may also perform a flow verification at least once during the 18-month sampling period or more often, if necessary, to ensure that the sampler flow rate remains within

acceptable limits. According to Section 8.3.5 of EPA's *Compendium Method TO-15* (**Appendix B** of this QAPP), the mass flow controller of the RM910A should produce flow rate values that agree within ±10% of the values given by a certified mass flow meter during a flow verification check. If the flow rate values are not within these limits, then the mass flow controller of the RM910A may need to be recalibrated, or there might be a leak or some other problem in the RM910A system that needs to be repaired.

The CNEP will perform a flow verification check of its RM910A sampler in accordance with the standard operating procedure (SOP) described in **Appendix F** of this QAPP. This SOP uses a primary standard - a Hastings HBM-1A bubble meter - attached to the outlet port of the RM910A to measure the flow rate. Flow verification forms are included with this SOP, as shown in **Appendix F** of this QAPP. Section 8.3.5 of EPA's *Compendium Method TO-15* (**Appendix B** of this QAPP) provides an alternate method of performing a flow verification on a subatmospheric pressure sampler like the RM910A. In this alternate method, a certified mass flow meter is connected to the *inlet* port of the RM910A, and a practice vacuum canister must be connected to the outlet port.

The flow rate of the RM910A should be approximately 3.4 to 3.5 cubic centimeters per minute (cc/min) for a single sample and approximately 6.8 to 7.0 cc/min for duplicate samples. [Thus the flow adjustment knob on the RM910A should be set to a voltage of approximately 1.67 V for a single sample and approximately 3.34 V for a duplicate sample.] If sample canisters have a final pressure of more than −1 inches of Hg at the end of a 24-hour sample collection period, then the flow rate of the RM910A should be reduced slightly by reducing the voltage setting of the flow adjustment knob (see SOP in **Appendix F** of this QAPP).

The pump pressure of the RM910A should be set to 22 or 23 PSIG by adjusting the system pressure knob. When sampling in very humid weather, with relative humidity of 90% or higher, the pump pressure may be adjusted to 20 PSIG to avoid getting moisture from the sampled air into the mass flow controller of the RM910A.

2.8 Acceptance Requirements for Supplies and Consumables

CNEP personnel will inspect all canisters and other supplies on receipt and notify the vendor and/or the contracted laboratory (ERG, Inc.) of any problems identified or suspected. For example, sample canisters must have a pressure of −29 inches of Hg to −30 inches of Hg when received from the lab in order to collect a valid sample. Canisters that have lost vacuum (that is, have a pressure of more than −29 inches of Hg) cannot be accepted and cannot be used for sample collection. Tubing and fittings for the sampler must be ⅛-inch diameter 316L stainless steel. A rebuild kit with viton seals for a stainless steel diaphragm pump will be included among the spare parts maintained for this project by the CNEP. The CNEP will also have a backup RM910A sampler ready for immediate use if the primary RM910A sampler at the Pryor site must be taken off line for more than one week for repairs. Prior to its use, the backup RM910A sampler will have passed a mechanical performance test, an EPA Compendium Method TO-15 (NATTS) certification, and a flow verification check, as

described in Section 2.7 of this QAPP.

2.9 Data Acquisition Requirements (Non-Direct Measurements)

Sample data for this project will be acquired directly. Supplemental data for this project (non-direct measurements) will be acquired from secondary sources. Supplemental data will include, but may not be limited to, the following: meteorological data (wind speed, wind direction, temperature, etc.) acquired from the Oklahoma Climatological Survey at the University of Oklahoma; EPA and state (ODEQ) data on VOC emissions from industrial sources near Cherokee Heights; population data from the U. S. Census Bureau; and human health data from the National Cancer Institute, the American Lung Association, and other sources. For example, wind rose diagrams provided by the Oklahoma Climatological Survey will be used by the CNEP to document the prevailing wind speeds and directions in Mayes County on the days on which VOC samples were collected. As another example, source emissions data will be used by the CNEP in conjunction with sample data in an effort to identify possible sources of VOCs found in project samples.

Meteorological data (wind speed, wind direction, temperature) for this project will be collected by both direct and non-direct measurements. Direct measurements of such parameters will be collected by means of meteorological instruments at the CNEP's Pryor site at Cherokee Heights. The following paragraph describes these instruments. Non-direct measurements of meteorological parameters will be acquired from the Oklahoma Climatological Survey's (University of Oklahoma's) meteorological (mesonet) station northeast of Pryor. [The data source is www.mesonet.org/premium.] The Oklahoma Climatological Survey's mesonet station is located approximately 9¾ miles north of the CNEP's Pryor site at Cherokee Heights (**Figure 3**). Data from these two meteorological stations should be similar due to their close proximity and to the uniform topography of the area.

Meteorological instruments at the CNEP's Pryor site at Cherokee Heights include a MetOne Model 010-C wind speed sensor, a MetOne Model 020-C wind direction sensor, a MetOne Model 592 temperature sensor, and a MetOne Model 593 relative humidity sensor. The performance of these instruments will be audited by the CNEP at least once each year, or more often if necessary, and the CNEP will calibrate these instruments as often as necessary to ensure that they provide data that meet the required specifications for accuracy. [Quality assurance and quality control specifications for these instruments are described in detail in the *Quality Assurance Project Plan [for the CNEP] Criteria & Meteorological Air Monitoring Network.*] An independent audit of these instruments will be performed once each year by Inquest Environmental, Inc. The accuracy of data collected by these instruments can be evaluated further by comparing it to the data from the Oklahoma Climatological Survey's mesonet station at Pryor. Data from the meteorological instruments at the CNEP's site at Cherokee Heights is entered into the EPA's AQS on-line database. The CNEP will use direct data from its own meteorological instruments at Cherokee Heights and data from the Oklahoma Climatological Survey's Pryor mesonet station in generating wind rose diagrams and evaluating the origins of any VOCs detected in samples collected for this project.

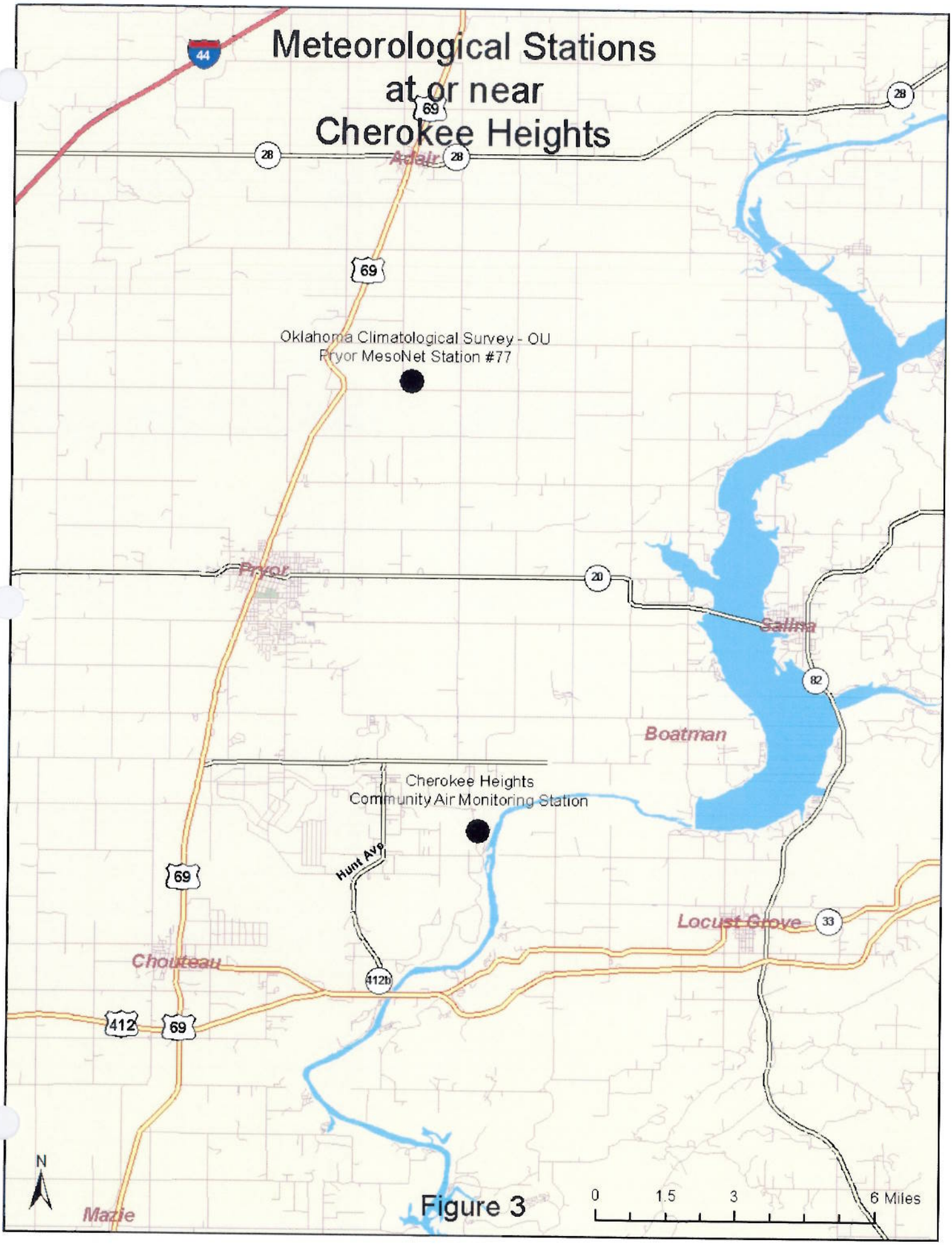

Meteorological Stations
at or near
Cherokee Heights
Adair
Oklahoma Climatological Survey - OU
Pryor MesoNet Station #77
Pryor
Salina
Boatman
Cherokee Heights
Community Air Monitoring Station
Hunt Ave
Locust Grove
Chouteau
Mazie
N
0
1.5
3
6 Miles

Figure 3

2.10 Data Management

Much of the data management process for this project lies within the contracted laboratory's (ERG, Inc.) domain. Because of this, and given the ERG's expertise and resources, ERG will be primarily responsible for the majority of the data management process. ERG's data management processes are described in its QAPP in **Appendix C** of this QAPP. The CNEP and ERG will confer and agree upon data management processes, as necessary.

ERG will report all 24-hour canister data to the U. S. EPA's AQS database, along with information specified by the AQS User's Guide, coded in the AQS format. [If necessary, the CNEP may perform this function.] Such air quality data and information will be fully screened and validated and will be submitted directly to the AQS via electronic transmission, in the format of the AQS, and in accordance with the annual schedule for AQS data submittal (i.e., within 90 days of the end of each calendar quarter).

ERG will send lab data reports to the CNEP within 45 days after the end of each month. ERG will submit data to the CNEP in pdf format (with VOC concentrations in both ppbv and $\mu g/m^3$). ERG may also submit data to the CNEP in excel format (with VOC concentrations in ppbv). ERG will submit statistical analyses of the data to the CNEP at the end of each year. Such statistical analyses will include mean, median, and standard deviation for each VOC during the sample period, as well as estimates of precision and bias.

The CNEP will maintain electronic or hard copies of all data, information, and documents submitted to it by ERG. The CNEP will also maintain electronic or hard copies of all data, information, and documents it generates with respect to this project, as well as electronic or hard copies of all supplemental data, information, and documents (as described in Section 2.9 above) pertaining to this project. Such data, information, and documents will be maintained in locked file cabinets in a climate controlled building at the CNEP office in Tahlequah. Such records will be permanently retained by the CNEP. This data may be shared with the EPA, the state of Oklahoma (ODEQ), and with other departments within the Cherokee Nation (particularly with Health Services). Some information may be provided to the residents of the Cherokee Heights tribal community by means of a public meeting.

SECTION 3
ASSESSMENT AND OVERSIGHT

3.1 Assessments and Response Actions

The manager of the CNEP air quality monitoring program and the QA manager of this air toxics monitoring project are responsible for reviewing and assessing all activities pertaining to this project to ensure that such activities meet project data quality requirements. The activities subject to such management level review and approval include, but are not limited to, sample collection, the evaluation of laboratory sample data, statistical analyses of data, data processing, the calibration, inspection, and maintenance of sampling equipment, the requisition and acceptance of supplies and equipment, the work of the contracted laboratory, data management, audits of data quality, technical systems audits, and performance evaluations. Staff meetings and peer reviews, involving any two or more members of the CNEP management and technical staff, may also be used to assess the effectiveness of such activities in meeting data quality requirements and project goals. Assessments of such activities will be conducted on an ongoing or as needed basis. For example, lab sample data will be reviewed each month when it is received from the contracted laboratory, while field records pertaining to sample collection may be reviewed every week, particularly when problems are reported by technical personnel.

Technical personnel working on each project task will have direct responsibility for the quality of their work, for ensuring that all objectives of the project and this QAPP are implemented, that operating parameters are within acceptable limits, and that corrective actions are taken when appropriate. Corrective action will be taken whenever it is determined that the measurement accuracy is outside acceptable limits, as stated in the data quality objectives. Corrective actions include:

- problem identification
- attempting to find the cause of the problem
- attempting immediate repairs, if possible
- reporting the problem to management and documenting the problem via field logbook entries, e-mails, and/or memos
- planning for major action, such as significant repairs, if needed
- checking and documenting that actions have been taken
- making changes to protocols or SOPs if necessary.

Major problems will be addressed as outlined above. Depending on the time and expense involved with corrective actions, it may be necessary to consult the EPA and the contracted laboratory before implementing any changes in planned activities. The resolution of major problems and routine problems will be documented in field logbooks, lab logbooks, correspondence, and/or e-mails by the parties involved in the problem resolution. Such records will enable the manager of the CNEP air quality monitoring program and the QA manager of this air toxics monitoring project to determine

how and when problems affecting data quality were resolved and how such problems may have affected data.

3.1.1 Project Assessments

Overall project success will be assessed in terms of delivery of finalized data and reports, and a comprehensive assessment of project success will be included in the final project report. Because of the limited nature and duration of this project, no formal intermediate reviews are anticipated beyond routine surveillance.

The manager of the CNEP air quality monitoring program and the QA manager of this air toxics monitoring project are responsible for reviewing the progress of this project on a monthly basis, or more often as necessary, to ensure that project goals are being met and that project milestones are being met in accordance with project timelines. Major changes in project goals or timelines must be documented in writing and approved by the EPA, with all parties affected by the changes - CNEP, EPA, and the contracted lab - being informed of such changes in writing. The manager of the CNEP air quality monitoring program and the QA manager of this air toxics monitoring project are responsible for negotiating such changes among affected parties and for informing all affected parties in writing of the changes agreed upon.

3.1.2 Sampling Assessments

Factors involved in assessing the quality of sampling processes include calibrations, verifications, instrument checks, data and documentation reviews, and adherence to procedural standards, as described in **Appendix A**, **Appendix B**, **Appendix F**, and in the laboratory QAPP in **Appendix C**. The QA manager of this project will review field logbooks and observe sample collection to ensure that SOPs are being followed and that sample quality is not being compromised. The QA manager is responsible for writing and amending SOPs and for documenting any changes in SOPs and corrections of problems. Such documentation may include e-mail messages to CNEP technical staff. The CNEP may flag or attach qualifiers to sampling data based on field operation events.

3.1.3 Analysis Assessments

Appendix B, the laboratory QAPP in **Appendix C**, and the *Technical Assistance Document for the National Ambient Air Toxics Trends and Assessment Program, Final Draft* (ERG, May 17, 2004) provide detailed information on assessments of the laboratory analyses of samples. The CNEP will review all lab data and discuss any issues cited by the lab that might affect data quality and data useability.

3.1.4 Data Quality Assessments

Criteria used for assessing the quality of laboratory data are described in **Appendix B** and in the

laboratory QAPP in **Appendix C**. Additional assessment of data quality will be performed by the contracted lab (ERG, Inc.) by means of statistical analyses of data after sufficient sampling has been done. Such analyses will include estimates of precision and bias. The CNEP's QA manager for this project will review all lab data and discuss with the lab any issues cited by the lab that might affect data quality and data useability. For example, if lab replicate samples and/or field duplicate samples have a relative percent difference greater than 25%, then the CNEP will have to determine if this limits the useability of any sample data related to those replicate and/or duplicate samples. The CNEP will further assess the quality of sample data by comparing that data to the benchmarks and MDLs shown in **Table 1** in **Appendix A** of this QAPP. Ultimately, data must be of sufficient quantity and quality to support a human health risk assessment and to meet the decision error limits of this project. The CNEP QA manager will consult with the lab and with CNEP technical staff to resolve any problems with data quality and to ensure that data meet the goals of the project. The resolution of problems will be documented in writing by the CNEP QA manager for this project and copies of that documentation will be distributed to all affected parties.

3.2 Reports to Management

The CNEP technical staff will report to the manager of the CNEP air quality monitoring program and/or the CNEP QA manager for this air toxics monitoring project about the status of project work and any problems that have been encountered. The manager and/or the QA manager will advise the staff of any necessary corrections and of project priorities, timetables, and data quality requirements. The manager and/or the QA manager will communicate directly with the EPA and the contracted laboratory (ERG, Inc.) at least once each month, or more often if necessary, about the status of the project, about any problems that may need to be resolved, and about any assistance that may be needed.

Data and QA reports, including summary information, will be prepared by the contracted laboratory and submitted to the manager of the CNEP air quality monitoring program. The CNEP will prepare a final project report not later than 90 days after completion of sample collection. The final project report will be provided to the EPA Region 6 office and to internal Cherokee Nation customers, such as the Cherokee Nation's Department of Health Services. The report may also be shared with other interested parties, such as the state of Oklahoma (ODEQ). The final project report will include data tables, statistical analyses of data, and other analyses of data, including a summary of potential impacts of detected VOCs on the health of tribal members living in Cherokee Heights. The final report will also include information on efforts to ensure that the project data meet project data quality requirements. Such information may include quality control checks, performance audits, standards certification, and data verification and validation.

SECTION 4
DATA VALIDATION AND USABILITY

4.1 Data Review, Verification, and Validation Requirements

Verification is the largely mechanical process of tracking, confirming, and cross-checking data elements to ensure that a specific datum can be shown to be accurate as compared to some standard. Operational QA/QC provisions, documenting traceability of standards, tracking sample media and equipment, and data entry crosschecks are some of the vital elements in the data verification process.

For activities performed by the CNEP, the sampling data verification process consists of visual verification of canister IDs, as well as reviewing field data sheets, sample tracking documents, and field logbooks. Data verification processes of the contracted laboratory (ERG, Inc.) are described in the laboratory QAPP in **Appendix C** of this QAPP. Finalized data submitted to the CNEP by ERG will be checked against CNEP records to complete the verification process.

Validation is the process of determining and documenting how accurately the sample data reflect the population conditions that were targeted by the measurement activities. Validation consists of procedures that identify deviations from measurement assumptions and procedures. Validation may result in assessment of a measurement as valid, conditionally valid, or invalid for further use. Validation occurs at all stages of the measurement process. In summary, data validation is a process in which data are evaluated to determine if they meet the specific technical requirements of a project and if they are useful or sufficient for meeting the goals and supporting the decisions of that project.

For activities performed by the CNEP, sample data will be assumed to be valid if no significant deviations from measurement assumptions have occurred in the collection or handling of the sample. Data validity may fall into question based on failure of transfer standards, field operators' reports of sampling event or sample handling anomalies, or anomalies revealed through examination of field data sheets, logbooks, or raw data. Data derived from duplicate samples, blank samples, and spike samples will also reveal whether there are problems with sample data validity. In such events, the manager of the CNEP air quality monitoring program and the QA manager for this air toxics monitoring project may jointly decide to attach qualifiers to the data or flag the data as invalid. For example, a datum may be flagged as conditionally valid if its MDL is higher than an EPA human health benchmark of concern. Validating sample analytical processes is the responsibility of ERG, and such data validation processes are described in ERG's QAPP in **Appendix C**. When lab data are finalized, higher level assessments of data validation may be made through statistical analyses.

4.2 Verification and Validation Methods

Data verification and validation are discussed in Section 4.1 of this QAPP. As part of the verification and validation process, the manager of the CNEP air quality monitoring program and the QA manager of this air toxics monitoring project will review all field data sheets, logbooks, lab

data, and other field and lab data and documents. They will also review any statistical analyses of data, as well as any supplemental (non-direct measurement) data. Verification and validation methods employed by ERG are described in ERG's QAPP in **Appendix C**.

4.3 Reconciliation with Data Quality Objectives

A wide variety of situations may occur in which data collected or generated by the CNEP or by ERG may not meet the data quality requirements of this project. Examples of such situations may include, but are not limited to, the following: (1) the MDL for a particular datum is higher than the EPA benchmark of concern; (2) duplicate, blank, or spike sample data reveal problems with the precision and accuracy of some data; and (3) equipment failure or operator error may compromise the integrity of a sample canister. When situations such as these occur, the CNEP must decide if the affected data can be used, despite their limitations, or must be rejected for use in the project.

In some cases, data may be useable, but those data may indicate that initial assumptions about VOCs in ambient air at the project site were incorrect. In such cases, the initial assumptions may be modified or discarded, which in turn may alter the goals and/or decision criteria of the project. The CNEP must then decide if it is necessary or worthwhile to modify initial plans for subsequent sample and data collection in order to meet the modified goals and decision criteria of the project.

In all such cases described in the previous two paragraphs, the CNEP may have to consult with the EPA and/or ERG, as necessary, in order to reach decisions about rejecting data, using data that is of limited value due to data quality deficiencies, modifying subsequent sample analyses, and modifying project goals and decision criteria. Such decisions will be documented in writing by the CNEP. Such documentation may be in the form of memos, letters, faxes, e-mails, revisions or amendments to the project work plan/QAPP, revisions to the contract with ERG, and other written records. Such documentation will explain the following: (1) the decisions that are being made and the reasons for those decisions; (2) how those decisions may modify the project work plan or the use of project data; (3) the expected benefits of those decisions and any consequent modifications; (4) any modifications to the project work schedule; and (5) any limitations on the use of project data. Such documentation will be retained in CNEP files, and copies of such documentation will be distributed to the EPA, the contracted laboratory, and other agencies, as necessary.

Revisions and modifications to the project work plan/QAPP and the contract with the laboratory (ERG) must be approved by the manager of the CNEP air quality monitoring program, who will notify ERG and the EPA of the revisions and modifications. Such notification will be in writing on a Cherokee Nation letterhead. EPA's written concurrence or approval of the revisions and modifications must be received by the CNEP before such revisions and modifications can be implemented.